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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/816,504	03/31/2004	John M. Boyd	LAM2P470	8622

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EXAMINER	
MACARTHUR, SYLVIA	

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 08/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)	
	10/816,504	BOYD ET AL.	
	Examiner	Art Unit	
	Sylvia R. MacArthur	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 May 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) *1-6* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *7-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of claims 7-24 in the reply filed on May 9, 2006 is acknowledged.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 7,8, 11, and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Aiyer (US 6,302,770).

Regarding claim 7: Aiyer teaches an in-situ pad conditioning for CMP polisher. The apparatus of Aiyer comprises an annular ring 208, a first layer 208CNdisposed over the ring wherein the first layer is compliant and a second layer 208CD disposed over the first layer wherein the second layer includes an abrasive component, see col. 3 lines 4-19 and Fig. 3C.

Regarding claim 8: The apparatus of Aiyer further comprises a shaft connected to the annular ring, the shaft having an axis coincident with an axis of the annular ring, see Fig. 2, the shaft is apart of 202.

Regarding claim 11: The apparatus of Aiyer further comprises that the second layer includes diamonds disposed within a matrix (embedded, originating from something else) wherein a portion of the diamond protrudes out of a bottom surface of the material, see col. 3 lines 21-37.

Regarding claim 13: The abrasive component is segmented, see col. 3 lines 21-37.

4. Claims 7,8, 11, and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Kim et al (US 6,290,584)

Regarding claim 7: Kim et al teaches a workpiece carrier with segmented and floating retaining elements. The apparatus of Kim et al comprises an annular ring 108, a first layer 118 isposed over the ring wherein the first layer is compliant and a second layer 104 disposed over the first layer wherein the second layer includes an abrasive component, see col. 4 lines 16-42 and Fig. 1.

Regarding claim 8: The apparatus of Kim et a further comprises a shaft connected to the annular ring, the shaft 102 having an axis coincident with an axis of the annular ring, see Fig. 1.

Regarding claim 11: The apparatus of Kim et al further comprises that the second layer includes diamonds disposed within a matrix (embedded, originating from something else) wherein a portion of the diamond protrudes out of a bottom surface of the material, see col. 5 lines 24-38.

Regarding claim 13: The abrasive component is segmented, see col. 5 lines 9-38.

5. Claims 7,8, 11, and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Hung et al (US 6,565,705)

Regarding claim 7: Hung teaches a wafer carrier for CMP. The apparatus of Hung comprises an annular ring 307, a first layer 304 disposed over the ring wherein the first layer is compliant and a second layer 306 disposed over the first layer wherein the second layer includes an abrasive component, see Fig. 3

Regarding claim 8: The apparatus of Hung further comprises a shaft connected to the annular ring, the shaft having an axis coincident with an axis of the annular ring, see Fig. 3, the shaft is apart of 201.

Regarding claim 11: The apparatus of Hung further comprises that the second layer includes diamonds disposed within a matrix (embedded, originating from something else) wherein a portion of the diamond protrudes out of a bottom surface of the material, see col. 1 lines 20-47.

Regarding claim 13: The abrasive component is segmented, Fig. 3.

6. Claims 7, 8, and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Nishimura (US 6,083,083).

Regarding claim 7:Nishimura teaches a substrate grinding device, comprising:

an annular ring 12; a first layer 13 disposed over a surface of the annular ring, the first layer configured to alternate between a compliant state and a rigid state, and a second layer disposed over the first layer, the second layer 12 including an abrasive component configured to grind a surface of a substrate, Figs. 1 and 2.

Regarding claim 8. The substrate grinding device of claim 7, further comprising: a shaft 15connected to the annular ring, the shaft having an axis coincident with an axis of the annular ring, see Fig. 1.

Regarding claim 14. A pre-planarization module configured to perform a long range planarization operation, comprising:a semiconductor substrate support configured to rotate about a first axis; andan annular ring having a first side of a compliant layer affixed thereto, a second side of the compliant layer affixed to a planarizing surface, the annular ring configured tomove pependicular and parallel to a plane associated with the substrate support, the annular ring further configured to rotate about a second axis, the second axis being offset from the first axis, wherein the substrate support and the annular ring rotate in a same direction, see claims of Nishimura.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 9, 10, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aiyer, Kim et al, and Hung et al (known henceforth as the *primary prior art)* et al in view of Elledge et al (US 7,033,251).

The teachings of the *primary prior art* have been discussed above.

Regarding claim 9: All the primary prior art fail to teach The substrate grinding device of claim 7, comprising an electromagnetic field generator configured to generate an electromagnetic fieldproximate to at least a portion of the first layer.

Elledge teches a polishing machine where a magnetic source is carried by the head and a magnetic fluid in the chamber, see abstract of Elledge. The motivation to modify the primary prior art to include a magnetic field is that magnetic field provide the force to cause the polisher to polish or flatten the topography of the substrate, see col.2 lines 26-51. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modify the primary prior art to include a magnetic source.

Regarding claim 10: Thhe substrate grinding device of claim 7, wherein the first layer includes a membrane surrounding a fluid, see abstract and Figs. 2, 4 and 6 of Elledge.

Regarding claim 12: The substrate grinding device of claim10, wherein the fluid is one of a magnetorheological fluid and a magnetorheological polymer, see the abstract and col. 4 lines 36-49 of Elledge .

9. Claims 15-17, and 19-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishimura et al in view of Elledge.

The teachings of Nishimura et al were discussed above.

Regarding claim 15: Nishimura et al fails to teach wherein the pre-planarization module of claim 14, such that the compliant layer is a bladder filled with a fluid, the fluid configured to alternate between a compliant state and a less compliant state. Elledge teches a polishing machine where a magnetic source is carried by the head and a magnetic fluid in the chamber, see abstract of Elledge. The motivation to modify the prior art of Nishimura et al to include a magnetic field is that magnetic field provide the force to cause the polisher to polish or flatten the topography of the substrate, see col.2 lines

26-51. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modify the primary prior art to include a magnetic source.

Regarding claim 16: The pre-planarization module of claim 15, wherein the fluid is a magnetorheological fluid, see the abstract and col. 4 lines 36-49 of Elledge .

Regarding claim 17: Neither Nishimura et al nor Elledge teach wherein the compliant layer is one of polyurethane and rubber. However, the material of construction of the compliant layer is a matter of optimizing a casue effective variable. It is well settled in the art according to In re Boesch that the optimization of a cause effective variable such as the material of construction is an obvious improvement. Pads made of such material as polyurethane and rubber possess the chemical and physical properties to the endure the harsch polishing environment. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to construct the compliant layer of polyurethane and rubber.

Regarding claim 19: The pre-planarization module of claim 16, further comprising: an electromagnetic field generator configured to generate an electromagnetic field proximate to at least a portion of the compliant layer, the electromagnetic field causing the fluid to change from the compliant state to the less compliant state, col. 4 lines 36-49 of Elledge.

Regarding claim 20: The pre-planarization module of claim 14, wherein the semiconductor substrate support includes a fluid capable of changing between a compliant state and a less compliant state in response to an electromagnetic field being generated proximate to the fluid col. 4 lines 36-49 of Elledge.

Regarding claim 21: The pre-planarization module of claim 14, wherein the compliant layer is a bladder filled with a polymer, the polymer configured to alternate between a compliant state and a less compliant state col. 4 lines 36-49 of Elledge.

Regarding claim 22: The pre-planarization module of claim 21, wherein the polymer is a magnetorheological polymer, see abstract of Elledge.

Regarding claim 23: The pre-planarization module of claim 22, further comprising: an electromagnetic field generator configured to generate an electromagnetic field proximate to at least a portion of the compliant layer, the electromagnetic field causing the polymer to change from the compliant state to the less compliant state, see abstract of Elledge.

Regarding claim 24: The pre-planarization module of claim 14, wherein the semiconductor substrate support includes a polymer capable of changing between a compliant state and a less compliant state in response to an electromagnetic field being generated proximate to the polymer, see abstract of Elledge.

10. Claims 14-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over the primary prior art in view of Elledge, as applied in claims 9, 10, and 12 above, in further view of Nishimura et al.

The teachings of the primary prior art in view of Elledge was discussed above. The modification fails to teach that the substrate support and annular ring rotate in the same direction. Nishimura et al teaches in the claims that the annular ring and the substrate support rotate with each other. The motivation to provide the modification of the primary prior art in view of Elledge with the means to rotate in the same direction is that rotating of the ring and support together help

increase the rate of the polishing and improve uniformity of the polishing result by the use of the centripetal force assisting in the overall force to polish. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modify the primary prior art to have the substrate support and annular ring rotate in the same direction.

Regarding claim 15: The primary prior art fails to teach wherein the pre-planarization module of claim 14, such that the compliant layer is a bladder filled with a fluid, the fluid configured to alternate between a compliant state and a less compliant state. Elledge teaches a polishing machine where a magnetic source is carried by the head and a magnetic fluid in the chamber, see abstract of Elledge. The motivation to modify the primary prior art to include a magnetic field is that magnetic field provide the force to cause the polisher to polish or flatten the topography of the substrate, see col.2 lines 26-51. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modify the primary prior art to include a magnetic source.

Regarding claim 16: The pre-planarization module of claim 15, wherein the fluid is a magnetorheological fluid, see the abstract and col. 4 lines 36-49 of Elledge .

Regarding claim 17: Neither the primary prior art nor Elledge teach wherein the compliant layer is one of polyurethane and rubber. However, the material of construction of the compliant layer is a matter of optimizing a casue effective variable. It is well settled in the art according to In re Boesch that the optimization of a cause effective variable such as the material of construction is an obvious improvement. Pads made of such material as polyurethane and rubber possess the chemical and physical properties to the endure the harsch polishing environment. Thus, it would have been obvious for one of

ordinary skill in the art at the time of the claimed invention to construct the compliant layer of polyurethane and rubber.

Regarding claim 19: The pre-planarization module of claim 16, further comprising: an electromagnetic field generator configured to generate an electromagnetic field proximate to at least a portion of the compliant layer, the electromagnetic field causing the fluid to change from the compliant state to the less compliant state, col. 4 lines 36-49 of Elledge.

Regarding claim 20: The pre-planarization module of claim 14, wherein the semiconductor substrate support includes a fluid capable of changing between a compliant state and a less compliant state in response to an electromagnetic field being generated proximate to the fluid col. 4 lines 36-49 of Elledge.

Regarding claim 21: The pre-planarization module of claim 14, wherein the compliant layer is a bladder filled with a polymer, the polymer configured to alternate between a compliant state and a less compliant state col. 4 lines 36-49 of Elledge.

Regarding claim 22: The pre-planarization module of claim 21, wherein the polymer is a magnetorheological polymer, see abstract of Elledge.

Regarding claim 23: The pre-planarization module of claim 22, further comprising: an electromagnetic field generator configured to generate an electromagnetic field proximate to at least a portion of the compliant layer, the electromagnetic field causing the polymer to change from the compliant state to the less compliant state, see abstract of Elledge.

Regarding claim 24: The pre-planarization module of claim 14, wherein the semiconductor substrate support includes a polymer capable of changing between a

compliant state and a less compliant state in response to an electromagnetic field being generated proximate to the polymer, see abstract of Elledge.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R. MacArthur whose telephone number is 571-272-1438. The examiner can normally be reached on M-F during the hours of 8:30 a.m. and 5 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Sylvia R MacArthur
Patent Examiner
Art Unit 1763

July 24, 2006